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AGGREGATES

A CASE STUDY OF RESOURCE MANAGEMENT IN ONTARIO

"A CHALLENGE IN COMMUNICATION"

by

George A. Jewett[1]

THE PROBLEM

Aggregates are an essential commodity for any industrial society, and are usually relatively so cheap and abundant that they tend to be considered inexhaustible. However, the deposits of sand and gravel in Ontario, *available* for future extraction, may not be sufficient to meet the Provincial needs beyond the year 2025 without general understanding by the public of the continuing need for this material. It is the only large volume, low cost mineral resource in Ontario for which we can identify a continuing demand and a diminishing availability.

The chief problems are Legislative restrictions and urban development on high resource areas which have rendered many of these deposits unavailable for extraction. In the Central Region of Southern Ontario only 4 percent of this widespread resource is still available for extraction. In Southwestern Ontario no more than 10 percent and in Southeastern Ontario no more than 14 percent remains available (Proctor & Redfern 1974, 1975, 1977). These small percentages remaining available truly reflect the need for improved Aggregate Resource Management in Ontario.

The chief shortage will be sand and gravel. The major alternative sites we have identified for this material all involve the need for transportation planning. They are Grey County (110 miles from Toronto), and sites in Northern Ontario adjacent to water or rail haulage (Ontario Mineral Aggregate Working Party, 1977, p.23-24).

[1]Executive Director, Division of Mines, Ontario Ministry of Natural Resources. This paper was presented at the 79th Annual General Meeting of the Canadian Institute of Mining and Metallurgy, Ottawa, Ontario, April 19, 1977.

While more remote areas may be used to meet future increased needs, it is clear that present levels of consumer demand will have to be met from current producing areas until such time as a transportation system can be put in place which can effectively compete with truck haulage.

The *problems* in providing for supply from the more remote areas may be summarized as follows:

Achievement of cost-efficient transportation and development making these more remote areas competitive with existing sources;

Accurate prediction of future aggregate demand patterns assuring that time and incentives are available for the planning of the necessary long distance transportation and production systems;

Achievement of these ends through management control while still allowing freedom of choice in a freely competitive environment.

THE FACTS

Production in some major resource areas close to the urban centres has reached levels which threaten the quality of life of the Municipality.

Ontario is endowed with vast deposits of high quality mineral aggregates, the bulk of which was deposited in South-Central Ontario.

Most of the resource is no longer available because of urban development or proximity to it. In some areas the loss has been total.

Photo 1 – This outwash sand and gravel deposit in Cambridge has been built over and thus will never be developed.

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Transportation economics and a free society force production to concentrate in those resource areas closest to the demand centres.

Demand in Ontario tends to be highly concentrated in urban areas. Metropolitan Toronto and immediate surrounding area, for example, accounts for over 30 million tons per year, at least one-quarter of the total Provincial demand.

THE SOLUTION

The problem is not unique to Ontario. The Greater London area, Vancouver, and many other urban areas large and small are facing the same issue today. Here in Ontario however, we have been working on the problem for 10 years, and some facts are emerging and perhaps a solution is in sight. As will be demonstrated *the solution* will not be easy, and depends on effective widespread communication of facts, most of which are highly technical.

Ten years ago Ontario began to detail the aggregate resources of the Province. We began with the major urban areas, and are moving to cover all of Southern Ontario, an area of 68,000 square miles. We will also carry the assessment into Northern Ontario. At first the studies were all carried out by the Provincial Division of Mines. More recently we have had to supplement these with a series of consultant studies to document the facts on supply and demand, and forecast future demands, and transportation patterns. These studies all of which to date have been produced by Proctor and Redfern Limited, indicate that the supply of material available for all of Southern Ontario is more than adequate to meet the future Provincial needs, but only if protected against uses that preclude extraction of the resource in the future.

To develop new sources of supply it is apparent that some sort of planning will be necessary if pressure from current producing areas is to be alleviated. It is now proposed as part of Provincial policy that all aggregate areas share appropriately in the supply of sand, gravel, and stone. It is further believed that planning must begin to provide for the transportation of these supplies from more remote areas. Governments at all levels must work together to identify and protect aggregate areas for the future, as well as providing for the location of redistribution and underground mining sites and storage areas.

The Proctor and Redfern studies also document the present demand patterns in the Province

and attempt to forecast future demands. It is clearly difficult to predict, with any accuracy, the long-term demand of any given region. Demand can be a function of economic conditions, major construction projects, or changes in the economics of transportation. It is apparent that these demand forecasts are on the fringe of economic theory today and that much research will be required before we can have much confidence in their accuracy.

Nevertheless, even after discounting the Proctor and Redfern figures by 25 percent, it is clear that future Provincial demands may increase by as much as 70 percent by the year 2000. It is not hard to imagine the consequences of adding this demand to the pressure on present sources.

We propose in Ontario, even acknowledging the difficulty of forecasting, that there is an alternative in a free economy.

Aggregate extraction is by its very nature a disturbing activity to local residents. If the industry is to be socially acceptable, surely everyone must understand the alternatives, be able to participate in the planning of the operation, and be confident that their essential interests will be protected. The hidden key to the problem is effective communication, not only do geologists, engineers, and planners have to understand the facts, but so does every farmer and resident of the affected area.

How is Ontario proposing to accomplish this perhaps idealistic objective?

Many Geological Maps indicating mineral aggregate deposits in Southern Ontario have been produced and more are being prepared for nearly the whole of Southern Ontario on a township basis. A case study of this is given later in this report explaining how we see the geological information being used by the planners.

Several Regional Municipalities have already considered the designation of mineral aggregates in their Official Plan documents and have provided interim policies for their identification and protection.

THE FUTURE

However, much more remains to be done. The recommended actions as suggested by the Ontario Mineral Aggregate Working Party (1977) with regard to planning for future needs are that:

Firstly, the Province provide Regional or County Municipalities with maps showing the location and extent of potential mineral aggregate deposits. The Ministry of Natural Resources proposes that these maps will be available in all the Township Offices in affected areas.

Secondly, a review of the demand-forecasting techniques be undertaken, and improved to the point where they can be of use in the planning of aggregate supply from alternative sources.

Thirdly, transportation studies be implemented incorporating transportation from remote areas of the Province, impacts of increased truck traffic, and feasibility of more extensive rail and water transportation. The results of these studies will have to be communicated effectively to all Ontarians.

Lastly all Counties and Regions include Mineral Aggregate Extraction Areas with supporting policies in their Official Plans to protect sufficient resources to meet an appropriate share of the future Local and Provincial needs (Ontario Mineral Aggregate Working Party Report, 1977).

Our Studies document that to date the controlling cost element in supplying aggregates to meet the demand is the cost of transportation. The major alternative sites we have identified for this material all involve a need for transportation planning. During the interim, the burden of supply must rest on current producing areas causing further strain on the local environment. The local environment already suffers, and many groups are complaining about degradation of their quality of life. Ontario is considering an approach which proposes that these people could accept aggregate extraction in the municipality only if:

They believe that their interests will be protected and that the disturbance to their environment is kept to an essential minimum;

They are being asked to accept no more than their share of the problem.

The key problem as yet unresolved is how to establish "an appropriate share"! The Working Party is suggesting that this appropriate share for a municipality be a ratio. This ratio

would involve the provincial demand and provincially available resources (supply). The municipal share of demand would be determined by the ratio of the provincial demand to the provincial supply. If there was an increase in the total available provincial resources then the municipal share of production would stabilize or decrease.

We must define the Provincial Resource Base. It is obvious of course that we will have to include several large aggregate areas identified, for water transport, on the north shore of Lake Superior, the St. Lawrence River, and deposits close to rail haulage in Northern Ontario that are surplus to local requirements. But equally important we will have to identify the resources in urban areas that have been made unavailable and encourage environmentally acceptable development of these deposits. Underground mining of stone is a possibility in Metropolitan Toronto and the Niagara Escarpment Planning Area, as well as the development of local deposits to meet at least local needs in such Municipalities as Mississauga, and North Bay (Ontario Mineral Aggregate Working Party Report, 1977, p.29-35).

It is also necessary to establish the feasible limits of transportation by water or rail from Northern Ontario to Southern Ontario markets. The implications of transportation studies to date are as follows:

The utilization of the trucking mode is least capital intensive and therefore will be adopted by industry unless all of the costs, including capital cost of road construction, are known and considered. Energy costs as well as the environmental impact of this traffic will have to be gathered and compared to rail haulage.

Rail receiving depots in Metropolitan Toronto are inadequate for any greatly increased rail haulage of aggregate to the Toronto market. Consequently the Province will have to study the feasibility of constructing larger aggregate receiving depots.

Water transport is certainly the least expensive, but of six ports examined in the Toronto area, only three are able to handle larger volumes of aggregates than at present. Therefore, either the construction of, or updating of harbour facilities is required to receive future aggregate requirements (Ontario Mineral Aggregate Working Party Report, 1977, Appendix 5).

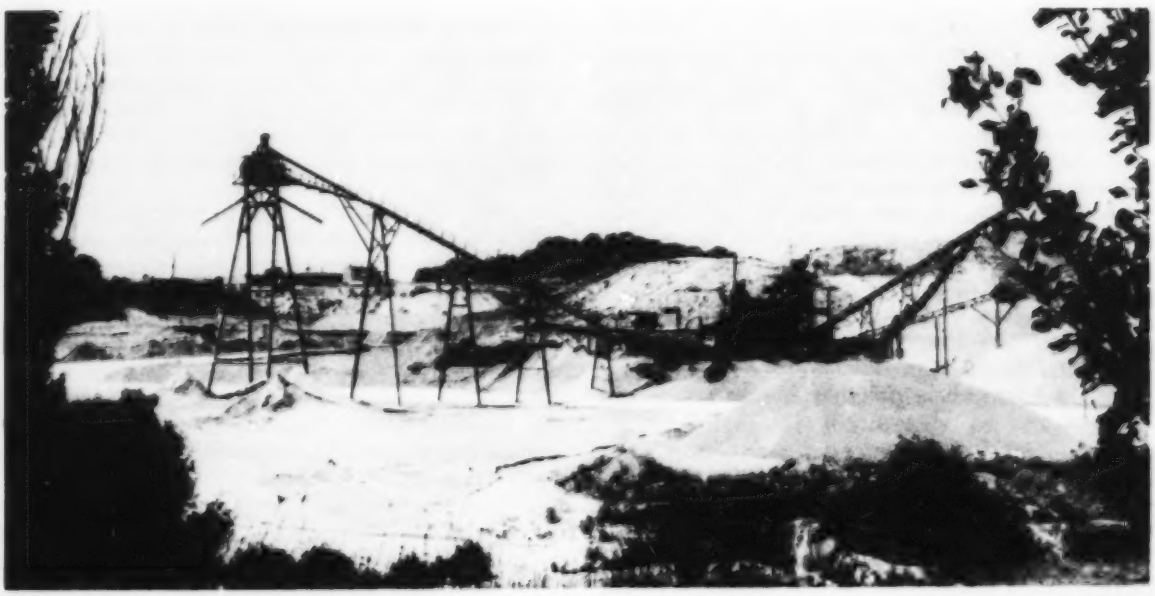

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Photo 2 – Sand and gravel pits are difficult to make inconspicuous but screening is helpful.

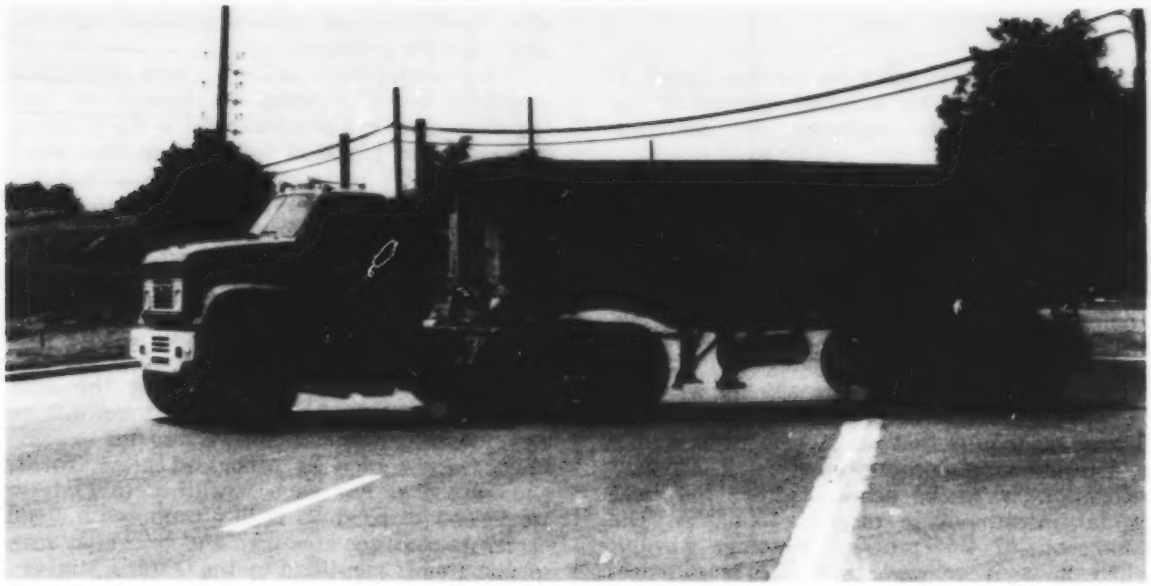

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Photo 3 – The vast majority of aggregate is transported by truck which has prompted public concern about the environmental effects of this traffic.

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Photo 4 – Rail redistribution yards, which cause environmental disturbance, must be close to the highly populated market areas.

and

All of the above must be communicated to and understood by a broad segment of the public, not just engineers and planners.

The difficulty is that the alternatives to road haulage, namely rail and water, require major capital investments for loading and unloading facilities if large volumes of aggregates are to be handled. This aspect of cost would have an increased financial impact upon the general public.

A further aspect is that aggregate demand is highly seasonal. There is virtually no weekend or winter movement. Economics of transportation will require that the movement be almost a continuous year-round venture if efficient utilization is to be achieved from the large capital investment in receiving facilities. The dimension of the problem becomes obvious when it is recognized that one must select 10-20 large sites, for redistribution yards, each close to a market that will be reasonably stable for 10 to 20 years. Each site must be located so that environmental disturbances would be acceptable in a densely populated area.

While such facilities can prove an acceptable alternative, it is clear that much further study is required to establish the feasibility of size, location, and costs. In addition, time is the critical factor, to research the problem, to obtain site approvals, and then construct the needed facilities. We can conclude therefore that such facilities will not be available until after 1985.

It is clear that all of us, engineers and geologists alike, will have to become more effective in communicating the results of our studies to achieve public comprehension. We have much to do to improve our techniques, but chiefly we have to recognize that what we do and say must be expressed clearly. The following is an example of how we propose to communicate in Ontario.

In the Industrial Minerals Division, General Session, the 79th Annual General Meeting of Canadian Institute of Mining and Metallurgy, Dr. W.R. Cowan explained the prototype of the proposed mineral aggregate resource area maps the Ontario Division of Mines has been working on for the last two years (Cowan 1977). Dr. Cowan's paper explains the details of how these maps are produced from the basic Quaternary geology maps. The following is an explanation of the planning process that should take place after these proposed mineral aggregate resource area maps are produced.

The planners want to know where the highest aggregate potential areas are located so that these resources can be considered in the planning process. Most planners fully realize they must consider all the resources and the total makeup of their Region, County, or Local Municipality before they can properly plan for the future. The public, on the other hand, has mixed feelings, some want to know the facts of their situation, others are disturbed by them.

The proposed mineral aggregate resource area maps will indicate where the best quality material is located without considering the constraints that may be imposed. There will be some consideration for cultural loss due to some basic feature such as urbanized areas, roads, and setbacks. For each township in Ontario we intend to produce both a proposed mineral aggregate resource area map and an overlay map of constraints identified by the Ontario Ministry of Natural Resources.

These constraints include: Conservation Authority Lands, County Agreement Forest Lands, Parks, sensitive areas such as hazard lands and floodplains. This information would be submitted in the form of overlay maps to the Regional, County, or Local Municipality staff or their consultant for consideration as the starting point on deciding which areas should be included or excluded for Official Plan purposes. It is suggested that the planners would then confer with the Ontario Ministry of Natural Resources staff to decide which of the identified areas should be designated as Mineral Aggregate Extraction Areas in the Official Plan recognizing that they must designate "sufficient" areas to meet the future demands for aggregate at least to the year 2025.

Some Counties or Regions may choose to incorporate all of the proposed mineral aggregate resource areas without constraints as an attached map so residents of the area can see where all the deposits are located.

Attaching a map of the mineral aggregate resource areas as an Appendix to the Official Plan is purely an indication of the location of mineral aggregates. The County or Region would then designate those acceptable areas that have no or few constraints in the Official Plan. Designation in the Official Plan would be recognition of the resources and an indication that extraction would be possible. However, before a new pit or quarry could be opened, a licence would have to be approved under the

TABLE 1 MINERAL AGGREGATE RESOURCE AREA PRELIMINARY ANALYSIS OF ADJALA, MANVERS, MONO AND MULMUR TOWNSHIPS.

	1	2	3[1]	4	5[2]	6	7	8	9	10
Township	Total Area (acres)	Proposed Mineral Aggregate Resource Area (acres)	MNR Constraint Area (acres)	Area to be Considered for Designation [2 minus 3] (acres)	Licensed Area Needed to Maintain Production to 2025 (acres)	Licensed Area 1976 (acres)	Average Annual Production 1973-1975 (tons)	Area Licensed with Aggregate Remaining to be extracted (acres)	Total Minimum Area to be Designated [5 minus 8] (acres)	Expected Area Opened for Extraction at any given time (acres)
Adjala	46,099	1,740	314	1,426	1,082	525.5	395,444	365	717	175
Mono	69,805	6,166	2,634	3,532	1,971	795.0	902,073	352	1,619	500
Mulmur	71,296	1,808	647	1,161	258	86.3	117,648	28	230	65
Manvers	73,082	3,456	495	3,036	1,754	2676.0	1,003,932	2011	Nil	700

[1]Includes county agreement forests, parks, crown land, hazard lands, sensitive areas, and Conservation Authority lands.

[2]Calculated using: $\frac{\text{average annual production x compounded 3.5\% annual increase to 2025}}{\text{2500 tons per acre foot x depth of deposit (feet)}}$

Act. Such a licence for a new pit or quarry would require a public meeting and public hearing held to consider all viewpoints and technical data. Again the need for communicating information and reasons to the public is apparent. We propose that just because an area is designated in an Official Plan does not mean it will ever be used for the extraction of sand, gravel, or stone since all the pros and cons of opening a new site must first be considered and found acceptable to the Municipality involved.

Once areas are designated in the Official Plan as Mineral Aggregate Extraction Areas, other uses that would preclude the future extraction of mineral aggregates would have to be carefully controlled. If buildings are located on areas of sand, gravel, or stone, the use of these resources in the future may be lost. Many of the land uses, however, agriculture, forestry, parks, or nature areas, would not preclude future aggregate extraction, and should be encouraged uses.

If an Aggregate Area designated as high potential in the Official Plan is to be urbanized without the aggregate being extracted first, a precondition of such development, would be to identify other equivalent resources within the Region or County. These other equivalent resources would then be redesignated for extraction by amendment to the Official Plan.

To protect residents, in areas not designated as Mineral Aggregate Extraction Areas, the Resident would have the assurance that if extraction was proposed the applicant would have to obtain an amendment to the Official Plan and Zoning By-Law before a licence application could even be considered under the existing procedure.

Examples of how the constraining effects of competing land uses might apply to specific townships are illustrated for Adjala, Manvers, Mono, and Mulmur Townships (Charts A, B, C, D, back pocket; and Table 1).

It must be emphasized again that in the policy proposed it is up to the Municipalities to choose, with the advice of an Aggregate Advisory Committee, the areas for extractive designation.

Since the Province must retain responsibility for resource management it is proposed that the Minister of Natural Resources would have the power to:

First require that aggregate resources sufficient to meet an appropriate share of the Provincial demand for the future be designated and protected;

Second to appeal to an Aggregate Resources Board if any Municipality refuses a licence application where the Crown believes that it could demonstrate that either the licence conditions were either vexatious or prohibitive, or that the Municipality had not licenced sufficient productive capacity to meet an appropriate share of the Provincial demand.

In both instances the onus of proof would be on the Crown.

COMMUNICATION

The essential element of the Provincial Policy Proposal is that:

All resource-rich Municipalities would share equitably in meeting the needs of the future. For such a policy to work it is essential that there can be no exceptions, for if one is excepted, why not another, and another, and so on until there is no policy except expediency. If expediency is to be the policy we can only ask "What incentive is there for any citizen or Municipality to act responsibly in the Provincial interest?".

Cost of transportation from remote supply areas will be subsidized by the Province where necessary. That is to say, if in the process of distributing demand equitably, it is proposed for the future, that Grey County or Northern Ontario become major suppliers to the Metropolitan Toronto market area, then costs, involved in shipping and distributing from these sources, that exceed the cost of truck haulage from local supply areas such as Caledon or Uxbridge or Mono, would be assumed by the Province and would either be borne by all Ontario Residents, or recovered by a tax on all aggregate shipped to the Metropolitan Toronto area.

These thoughts are tentative but they are put forward to illustrate the problems and implications of trying to provide for Resource Management in a free economy. It won't be easy, it may be possible, but only if there is the broadest understanding by all of Ontario residents of the facts will it be acceptable.

This is the challenge faced by all of us — Engineers, Geologists, Planners, and Civil Servants. And we all have a sizeable task to perform in the essential communication process.

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